CLAIMS

What is claimed is:

1. An optical scanning apparatus for light sources with different wavelengths, applying to light spots corresponding to different wavelengths scanning at the same position in order, comprising:

a plurality of light sources, generating a plurality of light beams of different wavelengths, each of the light beams passing through a collimator lens corresponding to each of the light sources to form a plurality of parallel beams as output;

a plurality of modulators, each of the modulators modulating an intensity and an on/off time of each of the light sources;

an optical beam combiner, combining the parallel beams from different directions into the same direction beams which users set the numbers of the output beam;

a reflective lens, reflecting the output beam generated from the optical beam combiner; and

a plurality of f-θ lenses corresponding to the light sources of different wavelengths, installed on a rotating platform with a rotating apparatus, and the reflective lens disposed at the middle of the platform, each of the f-θ lens rotating continuously by the rotating apparatus to make the output beam passing through the optical beam combiner, the reflective lens, and the f-θ lenses to deflect onto a scanned object and to generate linear scanning at a constant speed.

2. The optical scanning apparatus of light sources with different wavelengths of claim

1, wherein the light sources are laser light sources.

3. The optical scanning apparatus of light sources with different wavelengths of claim 1, wherein the light sources further comprising a cylindrical lens corresponding to each of the light source to shape the cross-section of the parallel light beams passing through the collimator lenses.

4. The optical scanning apparatus of light sources with different wavelengths of claim 1, wherein the optical beam combiner is composed of a plurality of substrates and the surfaces of the substrates are coated with a special material to reflect light of specific wavelengths.

5. The optical scanning apparatus of light sources with different wavelengths of claim 4, wherein the substrate is selected from the group consisting of glass and plastic.

6. The optical scanning apparatus of light sources with different wavelengths of claim 4, wherein the special material is selected from the group consisting of titanium dioxide (TiO_2) and silicon dioxide (SiO_2).

7. The optical scanning apparatus of light sources with different wavelengths of claim 1, wherein the output beam from the optical beam combiner is parallel with an optic axis.

8. The optical scanning apparatus of light sources with different wavelengths of claim 1, wherein the reflective lens is used to reflect the output beams from the optical beam combiner to each of the f-θ lenses.

9. The optical scanning apparatus of light sources with different wavelengths of claim 1, wherein the rotating apparatus is rotating at a constant angular speed.

10. The optical scanning apparatus of light sources with different wavelengths of claim 1, wherein each of the f-θ lenses is symmetric to its central optic axis.

11. The optical scanning apparatus of light sources with different wavelengths of claim 1, wherein the central optic axes of each of the f-θ lens are set up on the rotating apparatus with an angle evenly dividing the circle of the platform, and the height of the central optic axes of each of the f-θ lens upon the platform are differed by one third the central distance of adjacent light spots from the light source emitted onto the scanned object in order.

12. The optical scanning apparatus of light sources with different wavelengths of claim 1, wherein the fabrication of the f-θ lens is selected from the group consisting of unity injection molding and injection molding respectively with later assembly.

13. An optical scanning apparatus for light sources with different wavelengths, applying to light beams corresponding to different wavelengths scanning different positions, comprising:

a plurality of light sources, generating a plurality of light beams of different wavelengths, each of the light beams passing through a collimator lens corresponding to each of the light sources to form a plurality of parallel beams as output;

a plurality of modulators, each of the modulators modulating an intensity and an on/off time of each of the light sources;

an optical beam combiner, combining the parallel beams into an output beam;

a reflective lens, reflecting the output beam generated from the optical beam combiner; and

at least one f-θ lens corresponding to a single wavelength, installed on a rotating platform with a rotating apparatus, and the reflective lens disposed at the middle of the platform, each of the f-θ lens rotating continuously by the rotating apparatus to make the parallel beam passing through the optical beam

combiner, the reflective lenses, and the f-θ lenses to deflect onto a scanned object and to make the light beams corresponding to different wavelengths scanning different positions.

14. The optical scanning apparatus of light sources with different wavelengths of claim 13, wherein the light sources are laser light sources.

15. The optical scanning apparatus of light sources with different wavelengths of claim 13, wherein the light sources further comprising a cylindrical lens corresponding to each of the light source to shape the cross-section of the parallel light beams passing through the collimator lenses.

16. The optical scanning apparatus of light sources with different wavelengths of claim 13, wherein the optical beam combiner is composed of a plurality of substrates and the surfaces of the substrates are coated with a special material to reflect light of specific wavelengths.

17. The optical scanning apparatus of light sources with different wavelengths of claim 16, wherein the substrate is selected from the group consisting of glass and plastic.

18. The optical scanning apparatus of light sources with different wavelengths of claim 16, wherein the special material is selected from the group consisting of titanium dioxide (TiO_2) and silicon dioxide (SiO_2).

19. The optical scanning apparatus of light sources with different wavelengths of claim 13, wherein the reflective lens is used to reflect the output beams from the optical beam combiner to each of the f-θ lenses.

20. The optical scanning apparatus of light sources with different wavelengths of claim 13, wherein the rotating apparatus is rotating at a constant angular speed.

21. The optical scanning apparatus of light sources with different wavelengths of claim 13, wherein the output beam from the optical beam combiner is parallel with an

optic axis.

22. The optical scanning apparatus of light sources with different wavelengths of claim 13, wherein each of the f-θ lenses is symmetric to its central optic axis.

23. The optical scanning apparatus of light sources with different wavelengths of claim 13, wherein the fabrication of the f-θ lens is selected from the group consisting of unity injection molding and injection molding respectively with later assembly.

24. An optical scanning apparatus for light sources with different wavelengths, applying to light beams corresponding to different wavelengths scanning the same positions simultaneously, comprising:

a plurality of light sources, generating a plurality of light beams of different wavelengths, each of the light beams passing through a collimator lens corresponding to each of the light sources to form a plurality of parallel beams as output;

a plurality of modulators, each of the modulators modulating an intensity and an on/off time of each of the light sources;

an optical beam combiner, combining the parallel beams from different directions into the same direction beam which users set the numbers of the output beam;

a plurality of first reflective lenses, reflecting the output beam generated from the optical beam combiner; and

a plurality of f-θ lens sets corresponding to the light sources of different wavelengths, installed on a plurality of a rotating platforms on top of a rotating apparatus, each of the f-θ lens corresponding to each of the light sources of different wavelengths are parallel to each other and rotating

continuously by the rotating apparatus to make the parallel beams passing through the optical beam combiner, the reflective lenses, and the f-θ lenses to deflect, besides one of the parallel beam, the other parallel beams reflecting by a plurality of second reflective lenses corresponding to the wavelengths of the parallel beams to make the light beams with different wavelengths scanning the same positions simultaneously.

25. The optical scanning apparatus of light sources with different wavelengths of claim 24, wherein the light sources are laser light sources.

26. The optical scanning apparatus of light sources with different wavelengths of claim 24, wherein the light sources further comprising a cylindrical lens corresponding to each of the light source to shape the cross-section of the parallel light beams passing through the collimator lenses.

27. The optical scanning apparatus of light sources with different wavelengths of claim 24, wherein the optical beam combiner is composed of a plurality of substrates and the surfaces of the substrates are coated with a special material to reflect light of specific wavelengths.

28. The optical scanning apparatus of light sources with different wavelengths of claim 27, wherein the substrate is selected from the group consisting of glass and plastic.

29. The optical scanning apparatus of light sources with different wavelengths of claim 27, wherein the special material is selected from the group consisting of titanium dioxide (TiO_2) and silicon dioxide (SiO_2).

30. The optical scanning apparatus of light sources with different wavelengths of claim 24, wherein the first reflective lens is used to reflect the output beams from the optical beam combiner to each of the f-θ lenses.

31. The optical scanning apparatus of light sources with different wavelengths of claim

24, wherein the rotating apparatus is rotating at a constant angular speed.

32. The optical scanning apparatus of light sources with different wavelengths of claim 24, wherein the output beam from the optical beam combiner is parallel with an optic axis.

33. The optical scanning apparatus of light sources with different wavelengths of claim 24, wherein each of the f-θ lenses is symmetric to its central optic axis.

34. The optical scanning apparatus of light sources with different wavelengths of claim 24, wherein the first reflective lenses and the second reflective lenses are composed of a plurality of substrates and the surfaces of the substrates are coated with a special material to reflect light of specific wavelengths.

35. The optical scanning apparatus of light sources with different wavelengths of claim 34, wherein the substrate is selected from the group consisting of glass and plastic.

36. The optical scanning apparatus of light sources with different wavelengths of claim 34, wherein the special material is selected from the group consisting of titanium dioxide (TiO_2) and silicon dioxide (SiO_2).